Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in this Application:

Listing of Claims:

1. (Currently Amended) A method of producing a feed stock comprising a modified polyethylene for use in a process for forming an artifact, film or coating comprising the following steps:

(i) selecting a polyethylene having a crystalline phase and an amorphous phase;

(ii) imparting partial crosslinking, long chain branching and/or oxidation to the polyethylene by subjecting the polyethylene to a dose of ionizing radiation, where said dose is applied (a) when the polyethylene is at a temperature where both the crystalline and amorphous phases are present and (b) while the polyethylene is in an oxygen-containing atmosphere, and where the gel fraction of the polyethylene, after irradiation, ranges from 0.01 to 8%, by weight; and

iii) optionally adding additives to the polyethylene after irradiation.

2. (Original) The method of claim 1, where said polyethylene, prior to irradiation, is a high-density polyethylene with a density ranging from 0.945 to 0.970 g/cm^3.

3. (Original) The method of claim 2, where said polyethylene, prior to irradiation, has a melt flow index ranging from 0.1 to 2.0 g/10 min.

4. (Original) The method of claim 2, where said polyethylene, prior to irradiation, has a melt flow index ranging from 0.5 to 20.0 g/10 min.

5. (Original) The method of claim 1, where said polyethylene, prior to irradiation, is a linear low density polyethylene with a density ranging from 0.870 to 0.940 g/cm^3 and a melt flow index ranging from 0.4 to 10.0 g/10 min.

6. (Original) The method of claim 1, where said polyethylene, prior to irradiation, is a blend of

linear low density polyethylene and high density polyethylene, where said low density polyethylene has a density that ranges from 0.920 to 0.945 g/cm^3 and a melt flow index that ranges from 2.0 to 10.0 g/10 min., where said high density polyethylene has a density that ranges from 0.945 to 0.970 g/cm^3 and a melt flow index that ranges from 3.0 to 10.0 g/10 min, and where the ratio of linear low density polyethylene to high density polyethylene ranges from 80:20 to 40:60.

7. (Original) The method of claim 1 where said dose ranges from 4 to 60 kGy.

8. (Original) The method of claim 1 where said dose ranges from 8 to 30 kGy.

9. (Original) The method of claim 1 where said dose is imparted throughout the polyethylene such that the dose uniformity ratio ranges from 1.0 to 3.0.

10. (Original) The method of claim 1, where said dose is applied while the polyethylene is exposed to an unmodified atmosphere.

11. (Cancelled)

12. (Original) The method of claim 1 where the gel fraction of the polyethylene, after irradiation, ranges from 0.75 to 6%, by weight.

13. (Original) The method of claim 1 where one or more additives are added to the polyethylene after irradiation through a masterbatch.

14. (Currently Amended) The method of claim ~~15~~ 13 where the total concentration of additives in the composition after irradiation ranges from 0.01 to 0.4 weight percent.

15. (Currently Amended) The method of claim ~~15~~ 13 where the only additives added to the

polyethylene after irradiation are antioxidants.

16. (Original) A feed stock composition comprising a polyethylene irradiated by the method set forth in claim 1.

17. (Original) An artifact, at least one part of which is formed from a feed stock composition comprising a polyethylene irradiated by the method set forth in claim 1.

18. (Original) The artifact of claim 17, where said artifact is an extruded artifact and where said feed stock comprises an irradiated high density polyethylene.

19. (Original) The artifact of claim 18, where said artifact is an extruded pipe.

20. (Original) The artifact of claim 18, wherein said artifact is an extruded film.

21. (Original) The artifact of claim 17, where said artifact is a molded artifact made by injection molding, blow molding, rotational molding or other molding methods and where said feed stock comprises an irradiated high density polyethylene.

22. (Original) The artifact of claim 17, where said artifact is a blown film and where said feedstock comprises an irradiated linear low density polyethylene.

23. (Original) The artifact of claim 17, where said artifact is a blown film and where said feedstock comprises an irradiated blend of linear low density polyethylene and low density polyethylene.

24. (Original) The artifact of claim 17, where said artifact is a coated polar substrate and where said coating comprises an irradiated blend of linear low density polyethylene and high density polyethylene.

25. (Original) The artifact of claim 18, where said polar substrate is a metal substrate.

26. (New) A method of producing a feed stock comprising a modified polyethylene for use in a process for forming an artifact, film or coating comprising the following steps:

(i) selecting a polyethylene having a crystalline phase and an amorphous phase, and where said polyethylene is a high-density polyethylene with a density ranging from 0.945 to 0.970 g/cm^3;

(ii) imparting partial crosslinking, long chain branching and/or oxidation to the polyethylene by subjecting the polyethylene to a dose of ionizing radiation, where said dose is applied (a) when the polyethylene is at a temperature where both the crystalline and amorphous phases are present and (b) while the polyethylene is in an oxygen-containing atmosphere; and

iii) optionally adding additives to the polyethylene after irradiation.

27. (New) The method of claim 26, where said polyethylene, prior to irradiation, has a melt flow index ranging from 0.1 to 2.0 g/10 min.

28. (New) The method of claim 26, where said polyethylene, prior to irradiation, has a melt flow index ranging from 0.5 to 20.0 g/10 min.

29. (New) The method of claim 26 where said dose ranges from 4 to 60 kGy.

30. (New) The method of claim 26 where said dose is imparted throughout the polyethylene such that the dose uniformity ratio ranges from 1.0 to 3.0.

31. (New) The method of claim 26, where said dose is applied while the polyethylene is exposed to an unmodified atmosphere.

32. (New) The method of claim 26 where the gel fraction of the polyethylene, after irradiation, ranges from 0.75 to 6%, by weight.

33. (New) The method of claim 26 where one or more additives are added to the polyethylene after irradiation through a masterbatch.

34. (New) The method of claim 33 where the total concentration of additives in the composition after irradiation ranges from 0.01 to 0.4 weight percent.

35. (New) The method of claim 33 where the only additives added to the polyethylene after irradiation are antioxidants.

36. (New) A feed stock composition comprising a polyethylene irradiated by the method set forth in claim 26.

37. (New) An artifact, at least one part of which is formed from a feed stock composition comprising a polyethylene irradiated by the method set forth in claim 26.

38. (New) The artifact of claim 37, where said artifact is an extruded artifact and where said feed stock comprises an irradiated high density polyethylene.

39. (New) The artifact of claim 38, where said artifact is an extruded pipe.

40. (New) The artifact of claim 38, wherein said artifact is an extruded film.

41. (New) The artifact of claim 37, where said artifact is a molded artifact made by injection molding, blow molding, rotational molding or other molding methods and where said feed stock comprises an irradiated high density polyethylene.

42. (New) The artifact of claim 37, where said artifact is a blown film and where said feedstock comprises an irradiated linear low density polyethylene.

43. (New) The artifact of claim 37, where said artifact is a blown film and where said feedstock comprises an irradiated blend of linear low density polyethylene and low density polyethylene.

44. (New) The artifact of claim 37, where said artifact is a coated polar substrate and where said coating comprises an irradiated blend of linear low density polyethylene and high density polyethylene.

45. (New) The artifact of claim 38, where said polar substrate is a metal substrate.